Computer simulations in statistical physics

Examples of time series

RW: trace1, trace2, histogram

set1: traces, histogram, autocorrelation function

another autocorrelation function

Real-world example: DFMT-QMC
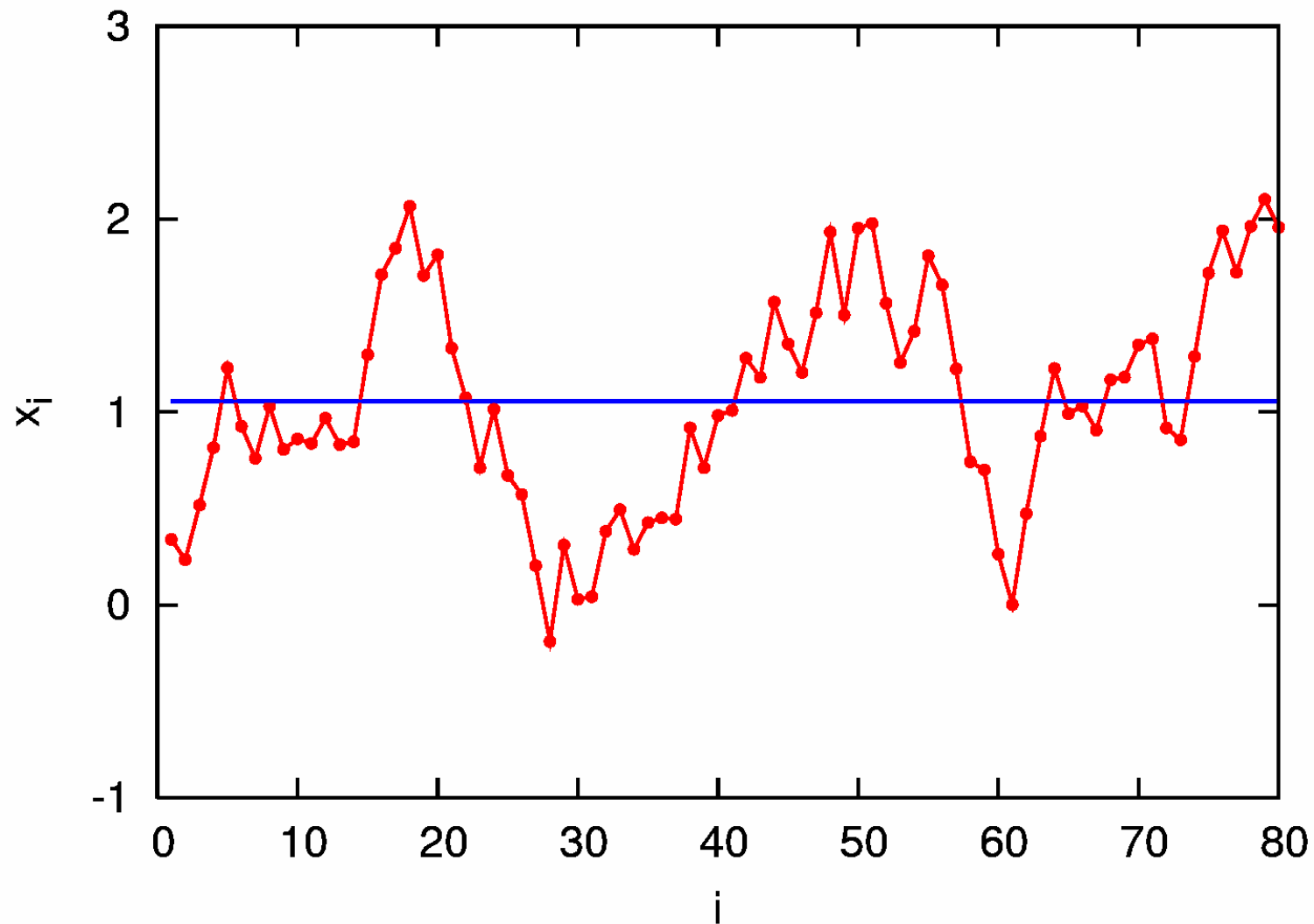
Real-world example: MC for Ising model

Figure 1: Trace of first 80 steps of a time series (red cirles and line); the horizontal blue line indicates the corresponding arithmetic average.
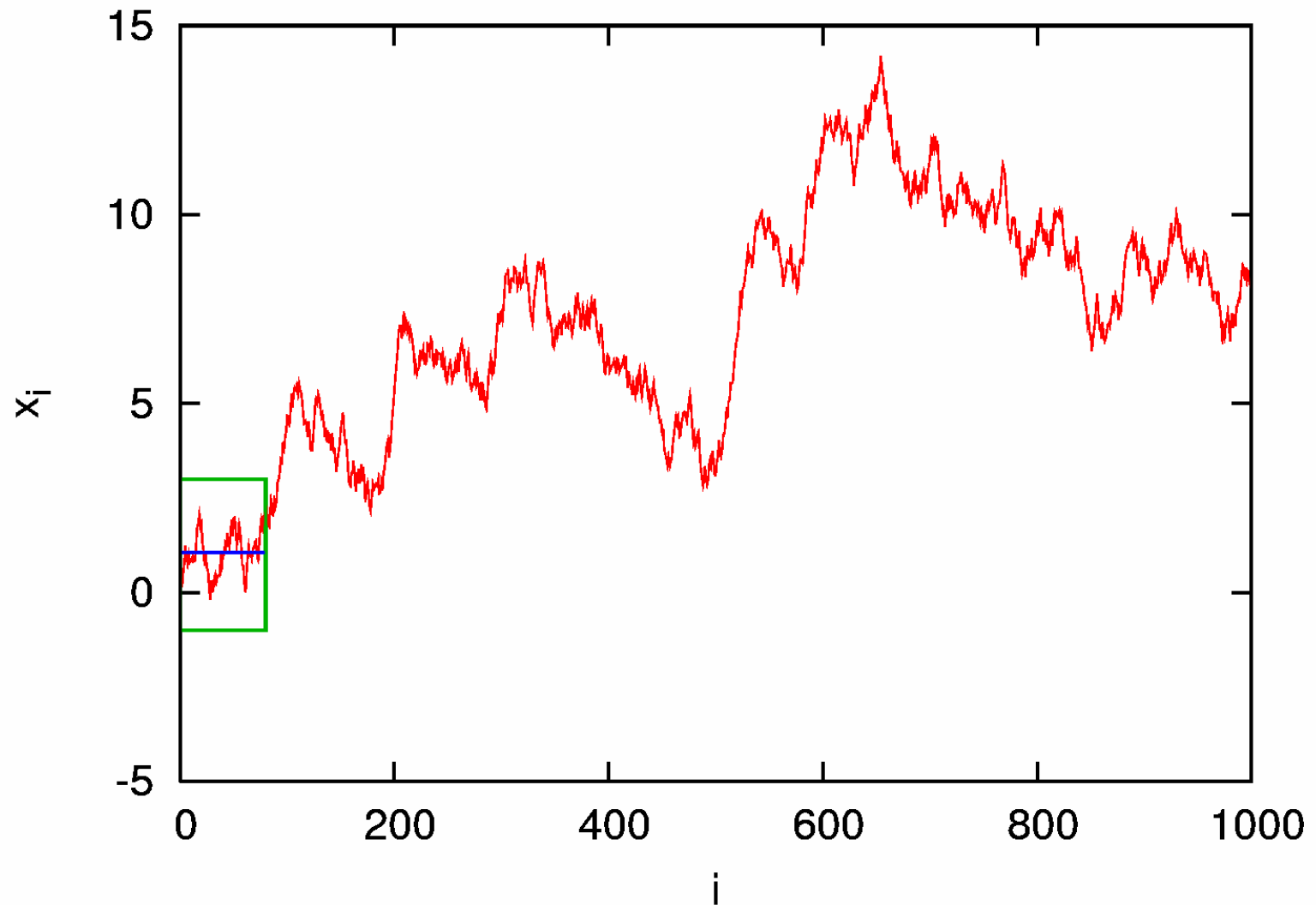
Figure 2: Trace of first 1000 steps of a time series (red line); the green square denotes the portion already shown in Fig. 1.
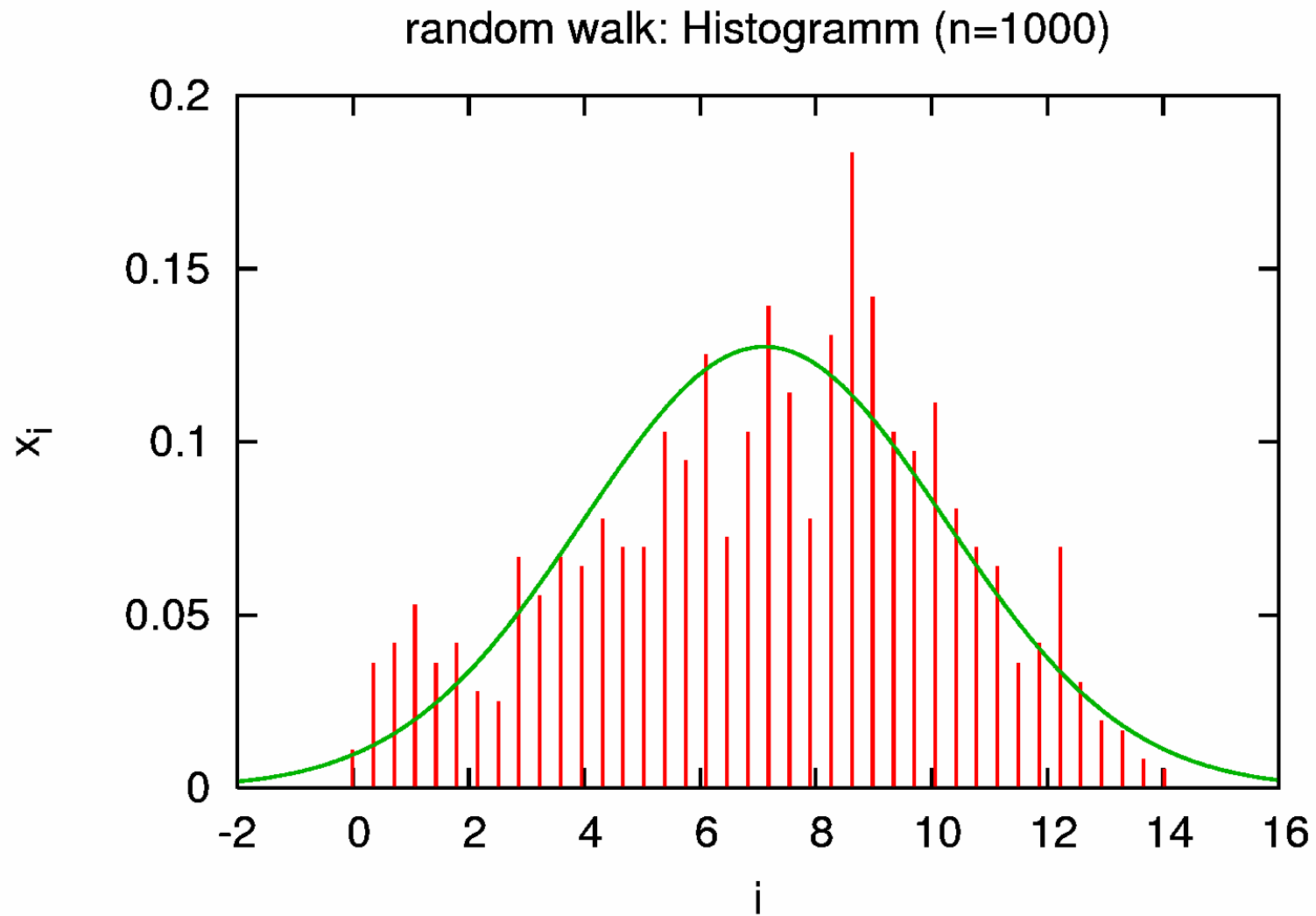
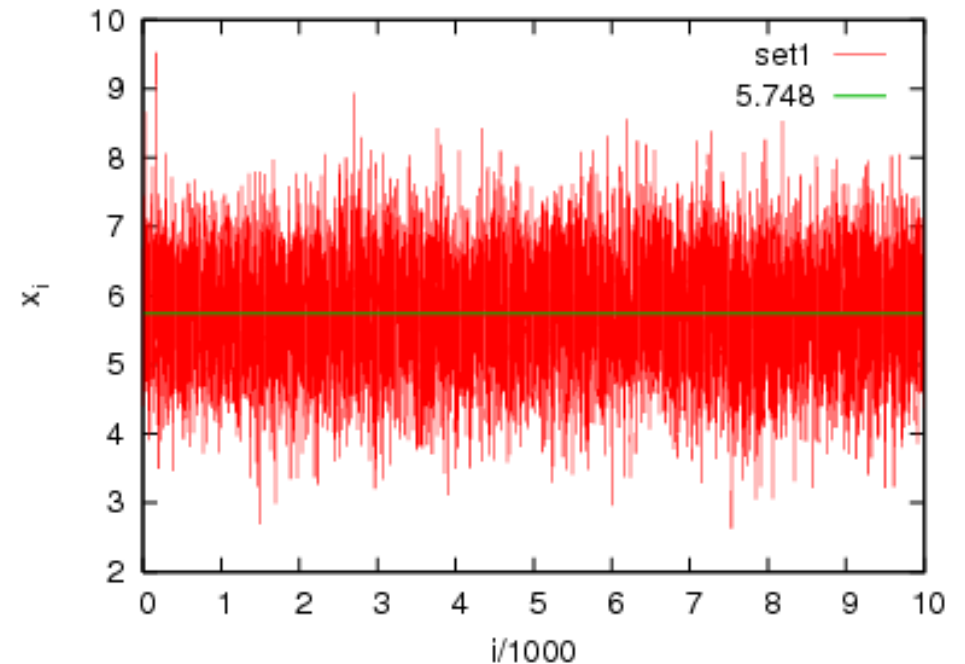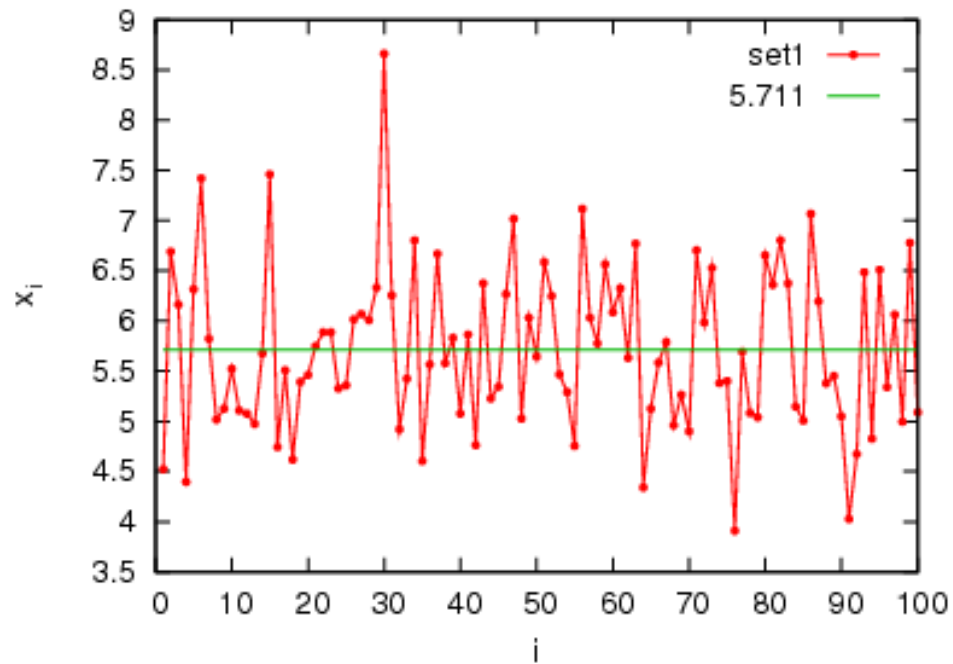Figure 3: Histogram of the data shown in Fig. 2.

Computer simulations in statistical physics · WS 2009/10 · Nils Blümer (Univ. Mainz)

◁ ↩ △ ▷ 4

Figure 4: Traces of a time series (red cirles and line). Left: first 100 data points; right: all 10000 data points. The green lines indicate corresponding averages.
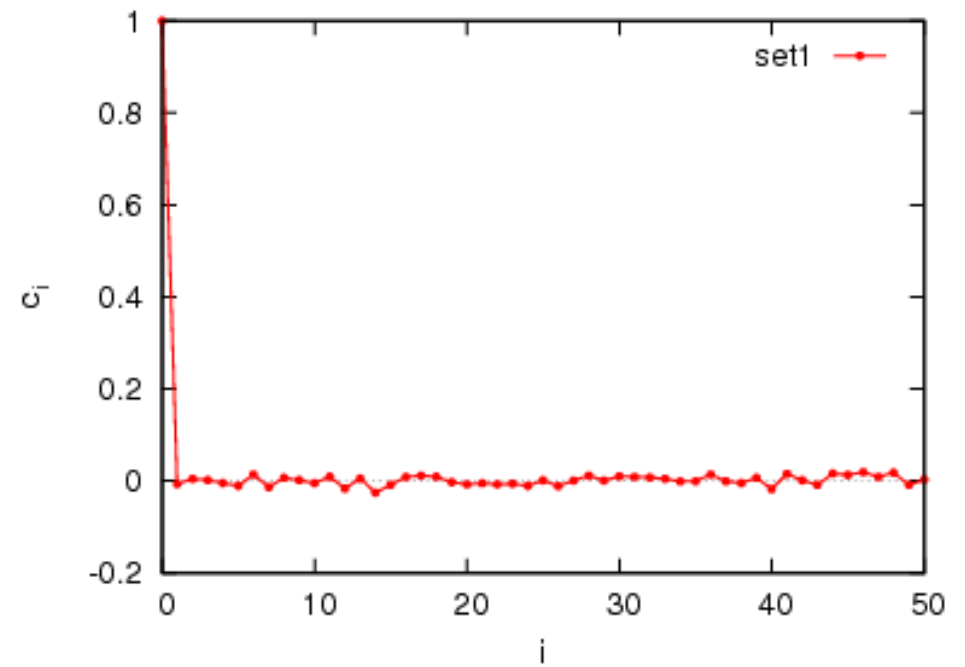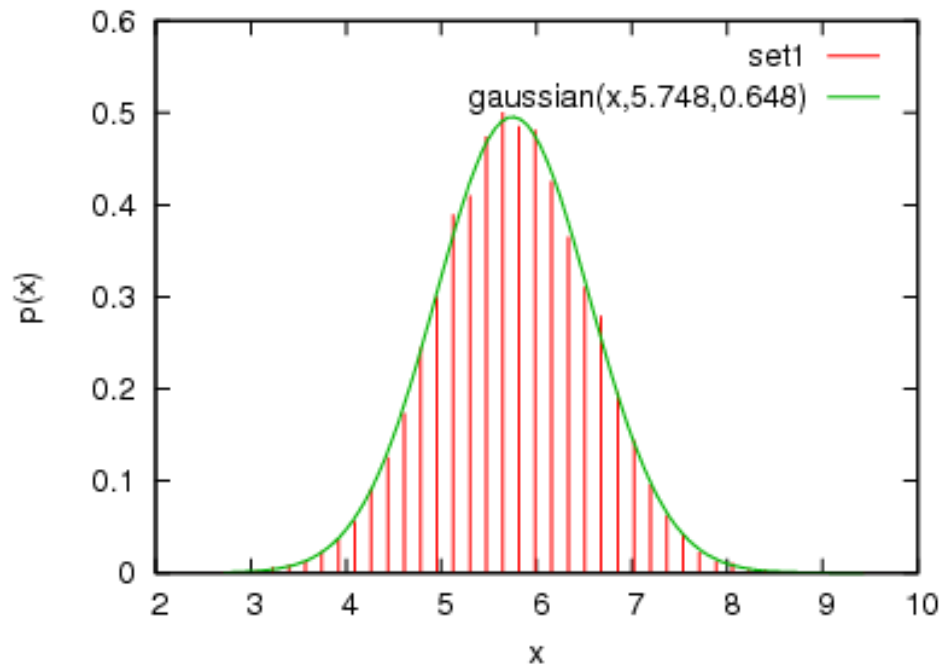
Computer simulations in statistical physics · WS 2009/10 · Nils Blümer (Univ. Mainz)

◁ ↩ △ ▷ 5

Figure 5: Left: histogram of dataset of Fig. 4; right: corresponding autocorrelation function.

Computer simulations in statistical physics · WS 2009/10 · Nils Blümer (Univ. Mainz)
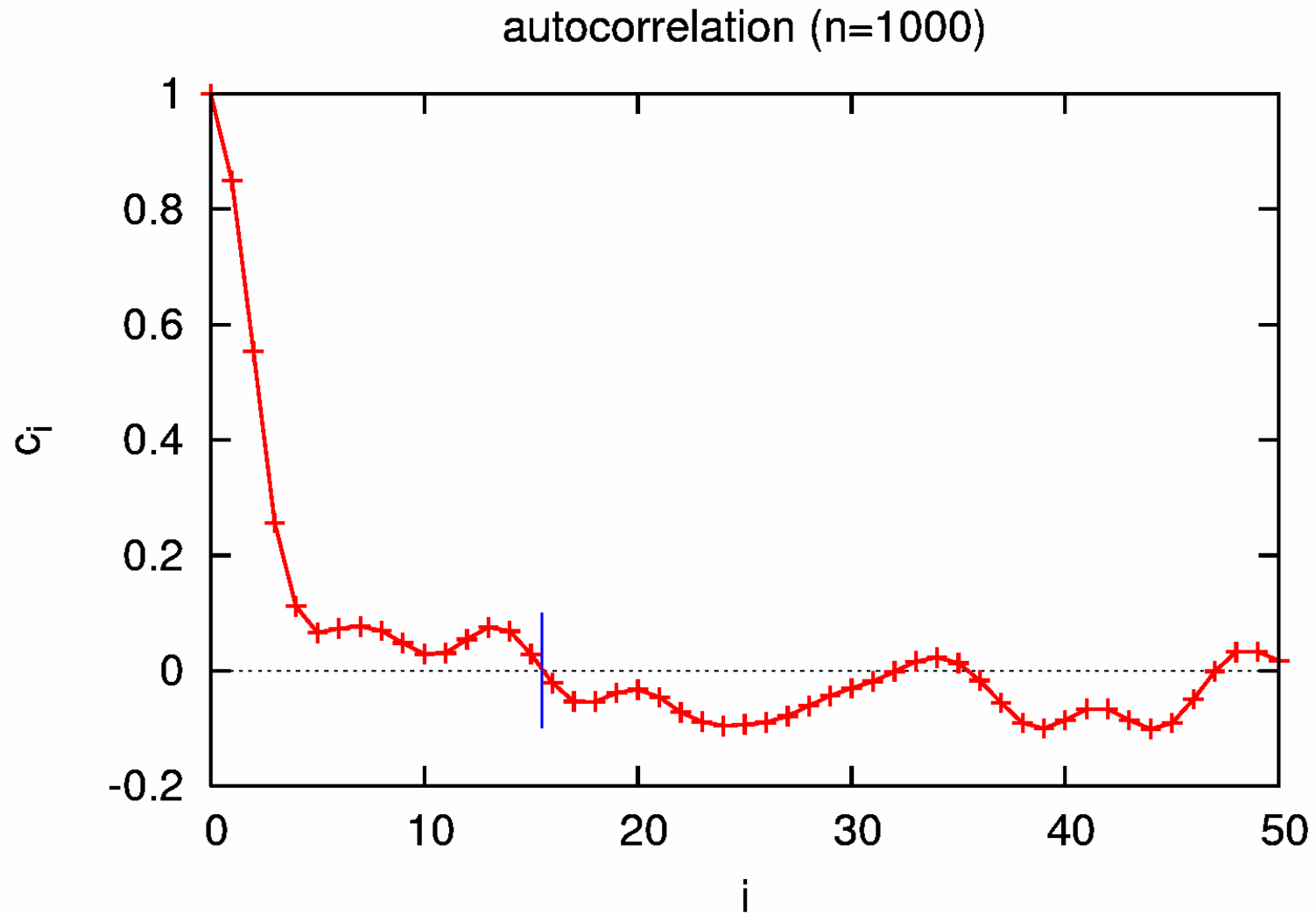
◁ ↩ △ ▷ 6

Figure 6: Estimated autocorrelation function of time series with 1000 data points.

Computer simulations in statistical physics · WS 2009/10 · Nils Blümer (Univ. Mainz)
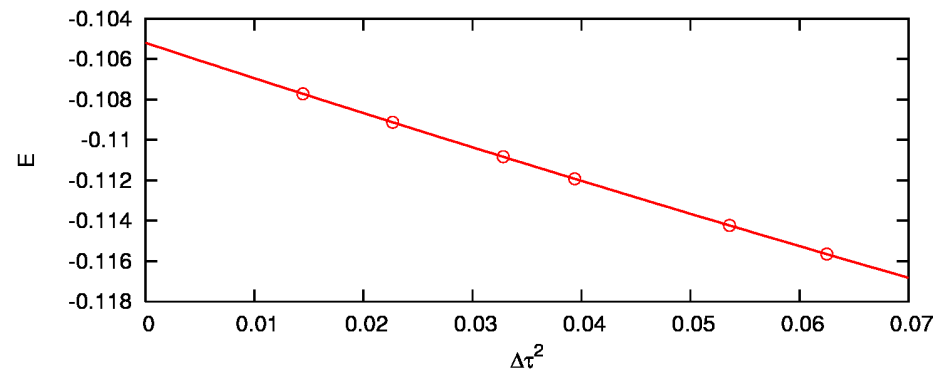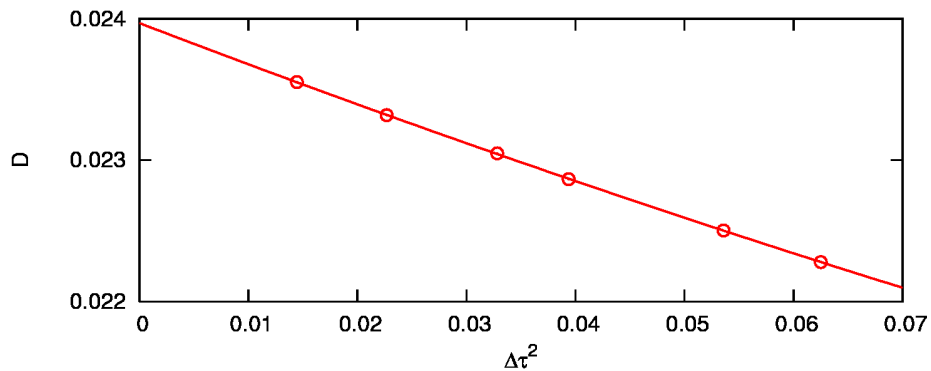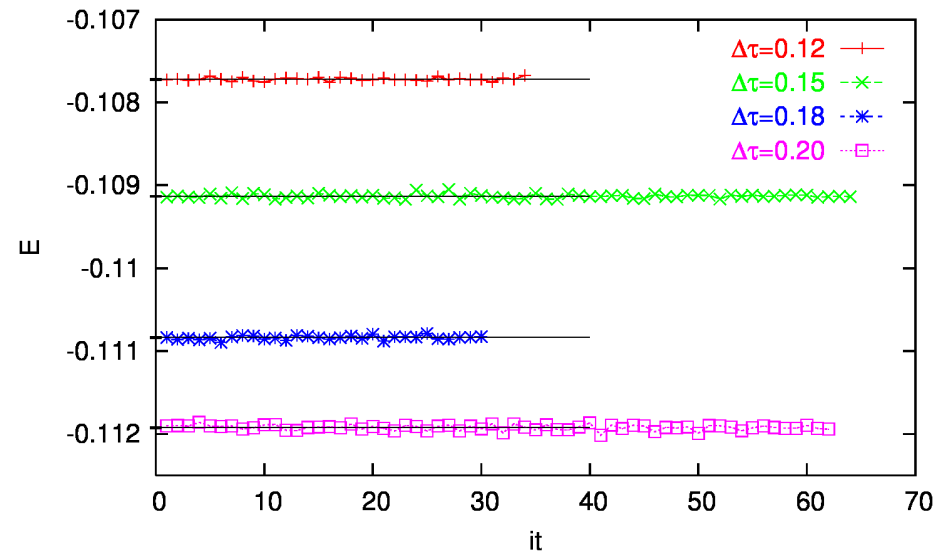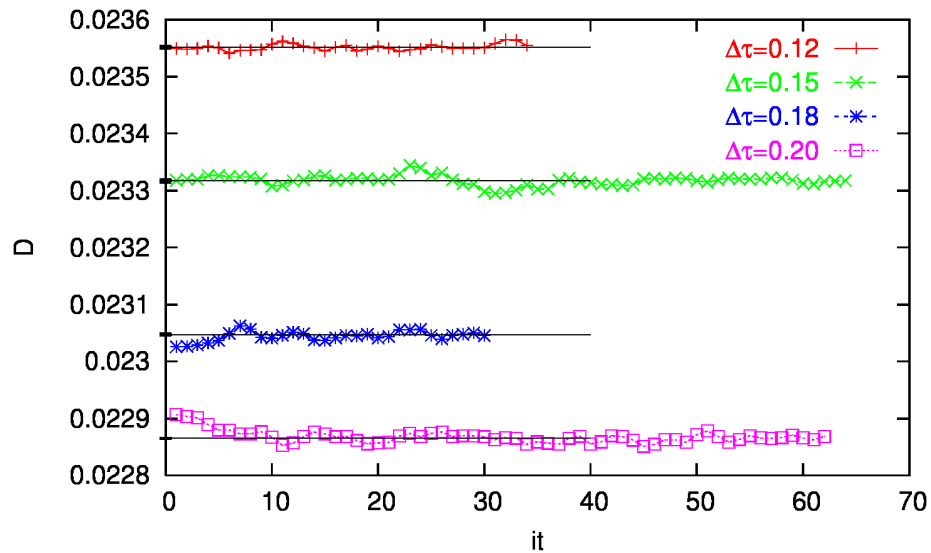
◁ ↩ △ ▷ 7

Figure 7: Real-world example: DMFT-QMC estimates of double occupancy (left) and energy (right) of half-filled frustrated Hubbard model at $U = 5$, $W = 4$, $T = 0.04$ (Mott insulator); top: traces of raw results; bottom: extrapolation $\Delta\tau \to 0$.
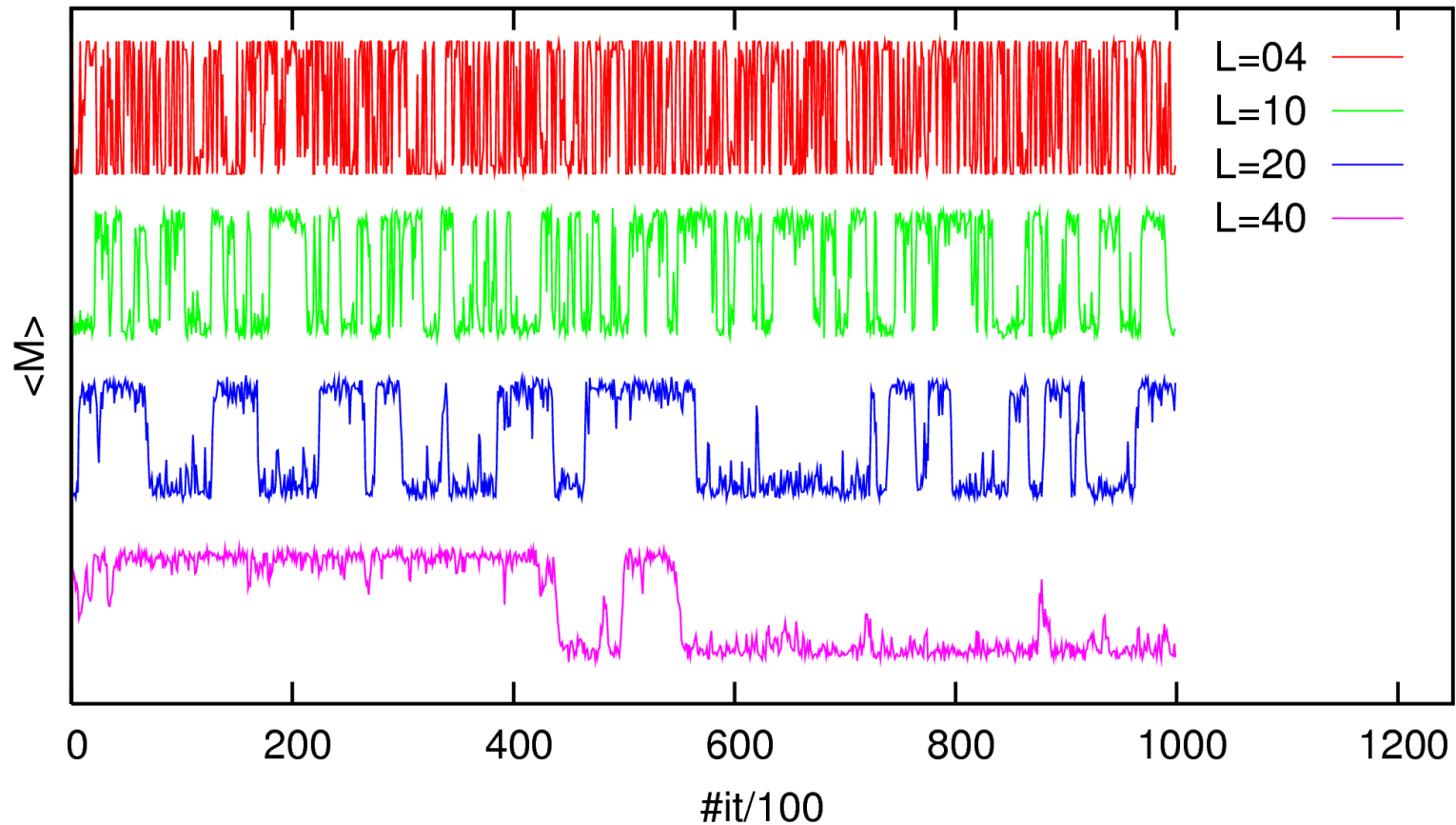
Figure 8: Real-world example: Trace of magnetization of Ising model using single-spin flip Metropolis algorithm at $T = 2.27 J/k_B \approx T_C$ (10^5 sweeps).